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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/569,554	11/02/2006	David Farrusseng	0512-1324	7749
466 7590 07/30/2009 YOUNG & THOMPSON 209 Madison Street Suite 500 ALEXANDRIA, VA 22314			EXAMINER POLYANSKY, ALEXANDER	
			ART UNIT 1793	PAPER NUMBER
			MAIL DATE 07/30/2009	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/569,554

Applicant(s)

FARRUSSENG ET AL.

Examiner

ALEXANDER POLYANSKY

Art Unit

1793

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 April 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 24-26 and 31-45 is/are pending in the application.
- 4a) Of the above claim(s) 38-45 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 24-26 and 31-37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SI/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claims 24-26 and 31-37 remain for examination where claims 24, 26, 31-32, and 37 have been amended, claims 27-30 have been cancelled.

Status of Previous Rejections

The 35 U.S.C. § 112, second paragraph rejection of claim 30 has been withdrawn in view of the applicant's amendment filed April 14, 2009.

The 35 U.S.C. 102(b) rejection of claim(s) 24-29, 32, 34 and 36-37 as being anticipated by Chen et al, US 6,187,157 has been withdrawn in view of the applicants' amendment filed April 14, 2009.

The 35 U.S.C. 103(a) rejection of claim(s) 30-31 and 33 as being unpatentable over Chen et al, US 6,187,157 has been withdrawn in view of the applicants' amendment filed April 14, 2009.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 24-26, 31-34, and 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al, US 6,187,157.

Regarding claim 24. Chen teaches the solid oxygen conducting (col. 10, line 15) membrane (col. 5, line 46) comprising:

-mixed conducting dense membranes (claim 18, column 9, lines 25) of multimetal (Table 1) oxide coated with solid electrolyte ion transport powder which is one of Pd, Ag or Pd/Ag alloy (column 6, lines 57-64),

Chen does not explicitly teach $\text{Ba}_x\text{Sr}_{1-x}\text{Co}_{1-y}\text{Fe}_y\text{O}_{3-z}$.

However, Chen teaches a mixed conducting dense multimetal oxide membrane $\text{La}_{1-x}\text{Sr}_x\text{Co}_{1-y}\text{Fe}_y\text{O}_{3-z}$ and the stoichiometric amounts are $0 \leq x \leq 1$, $0 \leq y \leq 1$ (Table 1, composition 1). Chen teaches other perovskites that contain Ba (Table 1, compositions 3 and 8, for instance) and in view of Chen's teaching a mixed conducting dense membrane perovskite coated with Pd, it would have been obvious to one of ordinary skill in the art to substitute La in position A for Ba in view of the broad disclosure of Chen that teaches the A position in the perovskite can be any one of La, Sr, Ba (column 10, table 1), or lanthanide (column 8, line 15). In re Ruff, 256 F.2d 590, 118 USPQ 340 (CCPA 1958). See MPEP 2144.08(4)(a).

Chen teaches z is determined from stoichiometry, which would render the compound neutral and inherently determine the oxygen deficiency (column 8, lines 13-27).

Regarding claim 25, Chen teaches the noble metal particle size ranges from about 0.1 to about 0.2 microns (100-200 nm) (column 7, lines 21-27), which falls within the claimed range.

Regarding claim 26, Chen teaches a mixed conducting dense multimetal oxide membrane has a perovskite structure (claim 13, col. 8, line 64).

Regarding claim 31, Chen teaches $\text{Ba}_x\text{Sr}_{1-x}\text{Co}_{1-y}\text{Fe}_y\text{O}_{3-z}$ composition as delineated by the examiner in the rejection of claim 24. Further, with regard to the claimed stoichiometric ratios $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{Co}_{0.5}\text{Fe}_{0.2}\text{O}_{3-z}$, Chen teaches the claimed x and y ranges of claim 24, thus the claimed ratios are met.

Regarding claim 32, Chen teaches the sintered oxygen membrane of 1 mm and its performance (figure 4). Chen teaches that various oxygen permeation tests were conducted with membrane discs of 1.1 mm (column 14, line 8), which is within the claimed thickness range.

Regarding claim 33, with respect to “the particles based on MgO or noble metals represent from 0.01 to 0.1 wt% of the weight of the dense membrane,” since Chen teaches the thickness of the mixed conducting dense membrane (both layers) is 1.1 mm (figure 4) which falls within the claimed thickness range of claim 32, and Chen teaches the claimed noble metal particle diameter of 100-200 nm which falls within the claimed range of claim 25, the claimed weight% of the noble metal particles would be expected in the noble metal particle layer of Chen. See MPEP 2112.01(I).

Regarding claim 34, Chen teaches that the catalytic activity of the second phase can be improved by a ceramic such as magnesia (column 13, lines 9-22).

Regarding claims 36 and 37, Chen teaches the noble metals are Pd, Ag or Pd/Ag alloy (column 6, lines 57-64).

Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. as applied above in view of Hazbun US 4,791,079.

Chen et al. in view of Hazbun is applied to claim 35 as set forth in the previous office action dated January 14, 2009.

Response to Arguments

Applicant's arguments filed April 14, 2009 have been fully considered, but they are not persuasive.

Arguments are summarized as follows:

(I). The applicants assert that none of the cited prior art teaches or infers this technology. More specifically, CHEN et al. fail to disclose or infer a membrane formed from a multimetal oxide compound having the formula $\text{Ba}_x\text{Sr}_{1-x}\text{Co}_{1-y}\text{Fe}_y\text{O}_{3-z}$ (claim 24) having a perovskite structure (claim 26). The applicants further assert that CHEN et al. relates to a *multi-phase* solid electrolyte ion transport membrane comprising at least *two phases* wherein one of the phases includes an oxygen ion single conductive material or a mixed conductor. The other phase comprises an electronically-conductive metal or metal oxide that is incorporated into the membrane by deposition of a metal or metal oxide from a polymer made by polymerizing a chelated metal dispersion in a polymerizable organic monomer or pre-polymer (see abstract). This second phase is microscopically uniformly *dispersed over* and bound onto the surface of the solid electrolyte ion transport matrix (see col. 6, lines 64-66).

(II). The applicants assert that various mixed conducting solid electrolytes are cited in table I but no mention is made of the perovskite structure defined in amended claim 24 of the present invention.

(III). The applicants note that the membranes disclosed in CHEN et al. are multi-phase composite materials: the second phase is thus dispersed into the first phase.

(IV). The applicants assert that HAZBUN only refers to a fluorite mixed conducting membrane and does not disclose or suggest to use any perovskite membrane, much less the membrane defined in amended claim 24 of the present invention. The applicants further note that the catalyst is dispersed within this porous ion conducting layer and is not directly in contact with the impervious mixed ion and electronic conducting ceramic.

Responses are summarized as follows:

(I). The Examiner's position regarding the teaching of the recited perovskite composition is as stated in the rejection of claim 24 above. Further, with respect to the *multi-phase* solid electrolyte ion transport membrane with *two phases*, it is the Examiner's position that the multi-phase solid of Chen reads on the instantly recited invention. Chen's multi-phase membrane is a perovskite with a layer of dispresed Pd or Pd alloy on it, which is substantially the same as claimed in claim 24.

(II). The examiner's position regarding the claimed perovskite composition is stated in the rejection of claim 24 above.

(III). The applicants' assertion that the second phase is dispersed into the first phase is incorrect. Claim 18 of Chen specifically teaches that the ion transport phase (i.e. second phase) is uniformly distributed on the surface of the first phase, which reads on the claimed a mixed conducting dense membrane of multimetal oxide, one surface of which is covered with dispersed particles based on magnesium oxide or noble metals.

(IV). The Examiner contends that the Hazbun reference was used to show that the ion conducting layer of vanadium doped magnesium oxide is known in the oxygen ion and electron conducting catalytic ceramic membrane art. Further, with regard to the assertion that the catalyst is dispersed within this porous ion conducting layer and is not directly in contact with the impervious mixed ion and electronic conducting ceramic, Hazbun teaches that the membrane consists of two layers, layer 1 which is an impervious mixed ion and electron conducting ceramic layer and layer 2 which is a porous catalyst-containing ion conducting ceramic layer (abstract), thus the assertion is incorrect. Furthermore, how is the catalyst that is dispersed in the ion

conducting layer NOT in contact with the ceramic, where the catalyst is dispersed on the surface or within the ceramic?

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEXANDER POLYANSKY whose telephone number is (571)270-5904. The examiner can normally be reached on Monday-Friday, 8:00 a.m. EST - 5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ALEXANDER POLYANSKY/
Examiner, Art Unit 1793

/Roy King/
Supervisory Patent Examiner, Art Unit
1793